

SCI Day of Science and Careers Being a patent attorney

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What is a patent attorney?



A patent attorney is

- A lawyer
- Specialised in the legal protection of inventions
- Mostly obtaining protection
 - —Drafting patent applications
 - —Arguing with patent offices
- Also advising on rights, eg licensing, freedom to operate
- And enforcement of rights, eg litigation



You get to work with

- Inventors and research teams
- Commercial and marketing teams
- Patent attorneys in other countries
- Patent examiners at UK and European Patent Offices
- Other lawyers (solicitors, barristers)



What do you need?



Essential and desirable qualifications

- A science or engineering degree
- Further degree is optional, but not unusual
- Proficiency at written English
- Foreign languages an asset
- Attention to detail
- Good communication and analytical skills



Qualification route

- Must be done under supervision of patent attorney (patent attorney firm or in-house department)
- First level exams Patent Examination Board or University course (Queen Mary, Bournemouth, Brunel)
- Final UK exams
- Two sets of exams for qualification before European Patent Office exam and "pre-exam"
- Expect to take 4 to 6 years
- Involves large amount of private study and for many their first experience of exam failure



Not all patents are complicated



United States Patent			nt				[15] 3,699,222		
Isaacs	et al.						[45]	Oct. 17, 1972	
	PRODUCTIO			[58]	Field of Sear	ch		424/85	

What is claimed is:

- 1. Interferon.
- 2. Human interferon.
- 3. Monkey interferon.
- 4. Chick interferon.



United States Patent Office

2,699,054 Patented Jan. 11, 1955

What is claimed is:

- 1. A compound chosen from the group consisting of tetracycline, the mineral acid salts of tetracycline, the alkali metal salts of tetracycline and the alkaline earth metal salts of tetracycline.
 - 2. Tetracycline.
 - 3. Mineral acid salts of tetracycline.
 - 4. Alkali metal salts of tetracycline.
 - 5. Alkaline earth metal salts of tetracycline.
 - 6. Tetracycline hydrochloride.



UNITED STATES PATENT OFFICE

2,230,654

TETRAFLUOROETHYLENE POLYMERS

I claim:

1. Polymerized tetrafluoroethylene.

2. The process of polymerizing tetrafluoroethylene which comprises subjecting it to superatmospheric pressure.

3. The process of polymerizing tetrafluoroethylene which comprises subjecting it to superatmospheric pressure in the presence of a catalyst.



United States Patent Office

3,156,523 Patented Nov. 10, 1964

What is claimed is:

- 1. Element 95.
- 2. The isotope of element 95 having the mass number 241.
- 3. The isotope of element 95 having the mass number 242.



But often they are...

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2015/0141399 A1 Aay et al.





MEK INHIBITORS AND METHODS OF THEIR USE

Publication Classification

defined in Group A, Group B, Group C, or Group D:

Croup, A.

As a splene optionally substituted with one, two, three or four groups selected from R.**, R.**, R.**, and R.**
where R.**, R.**, R.** and R.** are endpeendently hydrogon, sily, alkenyt, alkynyt, halo, halosukov, hydroxy, alkoy, anixov, anixov, alkylamino, halosikylamino, halosikyl, NISO,R.**, CA, CIOR.**, CIOPR.**, CIOPR.**
NR*R* and —NR*CYOPR* and where R.** is hydrogen. alkyl, or alkenyl;

X is alkyl, halo, haloolkyl, or haloalkoxy:

R1, R2, R3, R4, R5 and R6 are independently hydrogen, (NR^{2-r}(R^{2-st}), — CH,NR^{2-t}((=NH)(NR^{2-st}(R^{2-st}), — CH,NR^{2-t}((=NH)(N(R^{2-st}(NO₂)), — CH,NR^{2-t}((=NH)(N(R^{2-st}(NO₂)), — CH,NR^{2-t}((=NH)(N(R^{2-st}(NO₂)), — CH₂NR^{2-t}((=NH)(R^{2-st}(N where the alkyl, alkenyl, alkynyl, eycloulkyl, heteroary where the aix), autory), aix my, eyerounx), nescoory), and heterocycloalicyl are independently optionally sub-stituted with one, two, three, four, five, six or seven groups independently selected from halo, alkyl, halcolkyl, nitro, optionally substituted cycloalkyl, haloully, nitro, optionally substituted cycloully, optionally substituted and cycloully, optionally substituted and palack, optionally substituted and palack, optionally substituted and palack, optionally substituted and palack, optionally substituted duraction, of the control of the contro R6 together with the carbon to which they are attached form C(O) or C(-NOH):

m is 0. 1. or 2:

R7 is hydrogen, halo or alkyl:

R*, R* and R* are independently selected from hydrogen. hydroxy, optionally substituted alkoys, alkyl, alkenyl, alkynyl, ayd, cycloalkyl, heteroayd, and heterocy-cloalkyl; where the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroayd, and heterocycloalkyl are independently optionally substituted with one, two three,

four, or five groups independently selected from alkyl, halo, hydroxy, hydroxyalkyl, optionally substituted alkoxy, alkoxyalkyl, haloulkyl, carboxy, alkoxycarbonyl, alkenyloxycarbonyl, optionally substituted eveloalkyl, optionally substituted eveloalkyloxycarbo nyl, optionally substituted aryl, optionally substituted aryloxy, optionally substituted aryloxycarbonyl, optionally substituted arylalkyl, optionally substituted arvla optionally substituted heteroaryl, -S(O)_R31 (where r is 0, 1, or 2 and R³¹ is optionally substituted alkyl optionally substituted aryl, optionally substituted hetopnorany substituted arys, opnoranty substituted net-erocycloalityl, or optionally substituted heteroaryl), —NR³⁻⁸SO₂R⁸⁻⁶ (where R³⁻⁶ is hydrogen or alicyl and R³⁻⁶ is affayl, alkenyl, cycloalityl, aryl, heteroaryl, or heterocycloalityl), —SO₂NR³⁵R³⁻⁶ (where R³⁻⁵ is hydrogen or alkyl and R 35% is alkyl, alkenyl, cycloalkyl aryl, heteroaryl, or heterocycloalkyl), —NR 32C(O)R 52 (where R32 is hydrogen or alkyl and R320 is alkyl, alk enyl, alkoxy, or cycloalkyl), —NR³⁰R³⁰ (where R³⁰ and R³⁰ are independently hydrogen, alkyl, or hydroxyalkyl), and —C(O)NR33R33# (where R33 is hydrogen o alkyl and R33a is alkyl, alkenyl, alkynyl, or cycloalkyl):

R* is alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl and heteroeyeloalkyl; where the alkyl, alkenyl, alkynyl and neterocyclosisy; where the any), aitemy, attypty, aryl, cyclosikyl, heteroaryl, and heterocyclosikyl are independently optionally substituted with one, two, three, four, or five groups selected from halo, hydroxy, alkyl, halosikyl, halosikoxy, amino, alkylamino, and dialkylamino:

A is heteroarylene optionally substituted with one, two, there, or four groups selected from R¹⁰, R¹², R¹⁴, R¹⁴ and R¹⁷ where R¹⁰, R¹², R¹⁴ and R¹⁷ where R¹⁰, R¹², R¹⁴ and R¹⁷ are independitly hydrogen, alikyl, alikenyl, alkylynyl, hab, habolikovy, hydroxy, alkoxy, cyano, amino, alikylamino, fallsylamino, habolikyl, alkylamiforplamino, alkylearney, alkenylcarbonyl, alkoxycarbonyl, alkenyloxycarbonyl aminocarbonyl, alkylaminocarboryl, dialkylaminocar-boryl, or alkylcarbonylamino; where R¹⁷ is hydrogen, alkyl, or alkenyl; and where each alkyl and alkenyl, either alone or as part of another group within \mathbb{R}^{10} , \mathbb{R}^{18} , \mathbb{R}^{16} , and \mathbb{R}^{19} , is independently optionally substituted with halo, hydroxy, or alkoxy;

X is alkyl, halo, halcolkyl, or haloulkoxy;

R1, R2, R3, R4, R5 and R6 are independently hydrogen R, R, P, R, R, And R* are independently hydrogen-halen nitros. NPR**, OR*, NISSO(N, R*, CN, SO(), R*, SO(), NR*R*, −(CO), R*, CO) NR*, -CO) NR**, NR**, OR**, OR**, OR**, OR**, OR**, -NR**(OO) R**, NR**(OO) R**, NR**, OR**, -NR**(OO) R**, NR**, OR**, OR**, OR**, OR**, -NR**(OO) R**, NR**, OR**, OR**, OR**, OR**, -NR**(OO) R**, NR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, OR**, -CH, NR**(OR**, OR groups independently selected from halo, alkyl

haloalkyl, nitro, optionally substituted cycloalkyl, hatonkyi, nutro, optomatiy substantied cycloxikyi, optomatiy substantied televocyclosiky, optomatiy substanted arylalkyi, optomatiy substanted arylalkyi, optomatiy substanted heteroacyi, —OR* —NR*8°, —NR*SO, R°, —N, —SO, R°, —CO, PR, —CO, SO, —CO, NR*R*, —NR*C(O)NR*R*, —NR*C(O)NR*R*, —NR*C(O)OR* and $-NR^*C(O)R^*$; or one of R^1 and R^2 together with the carbon to which they are attached, R^3 and R^4 together with the carbon to which they are attached, and R^3 and R⁶ together with the carbon to which they are attached form C(O) or C(=NOH);

m is 1 or 2:

R7 is hydrogen, halo or alkyl; and

R. "R" and R" are independently selected from hydrogen, hydroxy, opionally substituted alkoys, alky, haloulkyl, alkeysl, alkyysl, any, cycloallyl, betwentyl, ale-encycloalkyl, where the alkyl, alkeysl, alkyysl, ary, cycloalkyl, where the alkyl, alkeysl, alkyysl, ary, cycloalkyl, heterouysl, and heterocycloalkyl are inde-pendently optionally substituted with one, two three. four, or five groups independently selected from alkyl, halo, hydroxy, hydroxyalkyl, optionally substituted alkoxy, alkoxyalkyl, haloalkyl, carboxy, carboxy ester, nitro, cyano, —S(O)₀R³¹ (where n is 0, 1, or 2 and R³¹ is optionally substituted alkyl, optionally substituted aryl,

opioxally substituted algis, optioxally substituted argi-opioxally substituted cylcolist, optioxally substituted heterocylcolisty, or opioxally substituted heteroary). —NR*S(0), 28** (where R* is phytogram, ilst), craft expl and R**. is alky, alleroyi, optioxally substituted and, optioxally substituted cylcolisty, optioxally sub-stituted heterocylcolisty, or optioxally substituted het-croaryls.—S(0), 28** (where R* is phytogra-alty), or sikeneyl and R** is a sikyt, alkeryl, optioxally substituted and, optioxally substituted cylcolisty, optioxally substituted and, optioxally substituted cylcolisty. substituted anyl, optionally substituted optionally substituted heterocycloulkyl, or optionally substituted cycloulkyl, optionally substituted cycloulkyl, optionally substituted anyla-optionally substituted anyla-option lkyl, optionally substituted aryloxy, optionally substituted arylaklyloxy, optionally substituted arylaklyloxy, optionally substituted heteroaryl, —NHC(O)R⁵² (where R³² is alkyl, alkenyl, alkoxy, or cycloalkyl) and —NR³⁰R³⁰ (where R³⁰ and R³⁰ are independently hydrogen, alkyl, or hydroxyalkyl), and C(O)NHR³³ (where R³³ is alkyl, alkenyl, alkynyl, or

where R10 is hydrogen, alkyl, alkenyl, alkynyl, halo, haloalkoxy, hydroxy, alkoxy, amino, alkylamino, dialkylamino, haloalkyl, —NES(O)₂R*, —CN, —C(O) R*, —C(O)OR*, —C(O)NR*R* and NR*C(O)R*; R^{10a} is hydrogen, alkyl, or alkenyl;

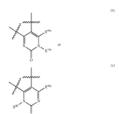
V1 is -CH- or -N-

X is alkyl, halo, halcolkyl, or haloalkoxy:

-NR C(O)OR", -NR C(O)R", -CH₂N(R") (NR ²⁵R ²⁵h), -CH₂NR ²⁵C(=NH)(NR ²⁵R ²⁵h), -CH₂NR ²⁵C(=NH)(N(R ²⁵N)(NQ₂)), -CH₂NR ²⁵C(=NH)(R(R ²⁵n)(N)), -CH₂NR ²⁵C(=NH)(R(R ²⁵n)(N)), -CH₂NR ²⁵C(NR ²⁵n R ²⁵h)=CH(NQ₂), alkyl, alkenyl, —CH₂NR**C(NR**-R***)—CH₁NO₂), anyl, altemyl, alkynyl, cycloalkyl, beteroaryl, or heterocycloalkyl, where the alkyl, alkernyl, alkynyl, cycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two, three, four, five, six or seven groups independently selected from halo, alkyl, halcalkyl, nitro, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted beteroaryl, $-QR^*$, $-NR^*S(O)$, R^* , $-NR^*S(O)QR^*$, $-R^*$, $-C(O)R^*$, $-C(O)QR^*$, $-C(O)QR^*$, $-C(O)QR^*$, $-C(O)QR^*$, and $-NR^*C(O)QR^*$; or one of R^* and R^2 together with the carbon to which they are attached, R3 and R4 togethe with the carbon to which they are attached, and R^2 and R^2 and R^2 together with the carbon to which they are attached form C(O) or C(=NOH);

R' is hydrogen, halo or alkyl; and

R*, R* and R_m- are independently selected from hydrogen, hydroxy, optionally substituted alkoxy, allyl, haloalkyl, alkoryl, alkyly, apl, syclosikyl, betwennyl, ale-the-encyclosikyl, where the alkyl, alkenyl, alkyryl, aryl, cyclosikyl, heterosayl, and heterocyclosikyl are inde-pendently optionally substituted with one, two three, pendentry optionally substituted with one, two three-four, or five groups independently selected from alkyl, halo, hydroxy, hydroxyalkyl, optionally substituted alkoxy, alkoxyalkyl, haloulkyl, carboxy, carboxy ester, nitro, cyano, — S(O)_mR³¹ (where n is 0, 1, or 2 and R³¹ is optionally substituted alkyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heterocycloalkyl, or optionally substituted heterocytly, —NR ³⁶S(O)₂R ³⁵s (where R ³⁵ is hydrogen, alkyl, or alkenvl and R55a is alkyl, alkenyl, optionally substituted aryl, anticky, optionally substituted cycloallyd, optionally substituted heterocycloallyd, or optionally substituted heterocycloallyd, or optionally substituted heterocycloallyd, or optionally substituted heterocycloallyd, or alkenyl and R^{37a} is alkyl, alkenyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heterocycloalkyl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, cyciousys, opioniany substituted networkiously, opionally substituted anylogically substituted anylogically substituted anylogically substituted anylogically substituted anylogically substituted harphilikyloxy, optionally substituted heteroaryl, —NHCO(DR²C where R²³ a salkyl, alkeryl, alkoxy, or cycloalkyl) and —NR²⁰R²⁹ (where R²⁰ and R²⁰ are



R⁴⁰ and R^{40a} are independently hydrogen or alkyl;

R[®] and R[®] are independently hydrogen or ally); X is illed, bub, blootily, or handelsovy; R, R², R², R³, R³ and R³ are independently protrogen, allow, nitro. ¬NR²P₂, −OR², ¬OR³(O), Part (O), OR³, −S(O), R³, −S(O), R³R², −C(O), ¬R³(C), OR³, −C(O), R³, −NR²(C), OR³, −NR²(C), OR³, −NR²(C), ¬C(O), ¬C(O) stituted with one, two, three, four, five, six or seven groups independently selected from halo, alkyl, haloulkyl, nitro, optionally substituted cycloulkyl, optionally substituted heterocycloalkyl, optionally sub-stituted aryl, optionally substituted arylalkyl, optionally substituted heteroaryl, —OR*, —NR*R*, —NR*S(O)
_R*, —C(O)R*, —C(O)R*, —NR*C(O)OR*
_C(O)NR*R*, —NR*C(O)NR*R*, —NR*C(O)OR*
and —NR*C(O)R*; or one of R¹ and R² together with the carbon to which they are attached, R3 and R4 together with the carbon to which they are attached, and R⁵ and R⁵ together with the carbon to which they are attached form C(O) or C(=NOH);

n is 1 or 2;

R² is hydrogen, halo or alkyl; and

R* R* and R₀-are independently selected from hydrogen hydroxy, optionally substituted alkoxy, alkyl, haloalkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl, where the alkyl, alkenyl, alkynyl, aryl, enceycially, where the allyt, alkenyl, allynyl, anyl, cycloxilly, heteronyl, and heterocyclallyl are inde-pendently optionally substituted with one, two three, four, or five groups independently selected from allyl, halo, Indroxy, Instrucyallyl, optionally substituted alkoys, alkoysallyl, halosillyl, carboxy, carboxy ester, mitro, cyano, —Scol), 82° (where n 5, 1, n 2 and 87° is optionally substituted allyl, optionally substituted

aryl, optionally substituted eveloalityl, optionally sub ary, optomary sometimed systems, cytocams ye, a stituted heterocyclosikyl, or optionally substituted heteroaryl). —NR*8S(O)₂R*6s (where R*8s is hydrogen, alkyl, or alkemyl and R*8s is alkyl, alkemyl, optionally substituted aryl, optionally substituted eyelosikyl, optionally substituted heterocyclosikyl, or optionally eponeany substituted neterocyclosity), or opionally substituted heteroary). —S(O)₂NR²²R²²" (where R² is hydrogen, alkyl, or alkenyl and R³" is alkyl, alkenyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or cyclosik), optionally substituted heterocyclosiky, or optionally substituted heterocyk; optionally substituted cyclosiky, optionally substituted heterocyclosiky, optionally substituted asylosiky, optionally substituted optionally substituted asylosiky, optionally substituted optionally substituted asylosiky, optionally substituted necessary, "NRCOR" (where R" is siky), alse-cyt, alknow, or cyclosiky) and "R" "R" (where R" and R" are independently indogen, ally), or photop-siky), and "COMBR" (where R" is siky), alse-(SOMBR" (where R" is siky), also, and siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), also, and siky), and "COMBR" (where R" is siky), and

We claim:

1. A compound of formula I:

or a pharmaceutically acceptable salt or solvate, thereof, wherein A, X, R¹, R², R³, R⁴, R⁵, R⁶, and R⁷ are as defined in Group A, Group B, Group C, or Group D:

Group A

A is arylene optionally substituted with one, two, three or four groups selected from R¹⁰, R¹², R¹⁴, R¹⁶, and R¹⁵ where R¹⁰, R¹², R¹⁴ and R¹⁶ are independently hydrogen, alkyl, alkenyl, alkynyl, halo, haloalkoxy, hydroxy, alkoxy, amino, alkylamino, dialkylamino, haloalkyl, —NHS(O)₂R⁸, —CN, —C(O)R⁸, —C(O)OR⁸, —C(O) NR⁸R⁸ and —NR⁸C(O)R⁸ and where R¹⁹ is hydrogen, alkyl, or alkenyl;

X is alkyl, halo, haloalkyl, or haloalkoxy;

R1, R2, R3, R4, R5 and R6 are independently hydrogen, halo, nitro, -NR8R8, -OR8, -NHS(O)2R8, -CN, $-S(O)_m R^8$, $-S(O)_2 N R^8 R^8$, $-C(O) R^8$, $-C(O) O R^8$, -C(O)NR⁸R⁸', -NR⁸C(O)OR⁸', -NR⁸C(O)NR⁸'R⁸' $-NR^8C(O)OR^{8'}$, $-NR^8C(O)R^{8'}$, $-CH_2N(R^{25})$ $(NR^{25a}R^{25b}),$ $-CH_2NR^{25}C(=NH)(NR^{25a}R^{25b})$ —CH₂NR²⁵C(=NH)(N(R^{25a})(NO₂)), —CH₂NR²⁵C $(=NH)(N(R^{25\alpha})(CN)), -CH_2NR^{25}C(=NH)(R^{25}),$ -CH2NR25C(NR25aR25b)-CH(NO2), alkyl, alkenyl, alkynyl, cycloalkyl, heteroaryl, or heterocycloalkyl; where the alkyl, alkenyl, alkynyl, cycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two, three, four, five, six or seven groups independently selected from halo, alkyl, haloalkyl, nitro, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted heteroaryl, —OR8, —NR8R8°, —NR8S(O) $_{2}R^{9}$, —CN, —S(O), $_{2}R^{9}$, —C(O)R⁸, —C(O)OR⁸ -C(O)NR⁸R⁸', -NR⁸C(O)NR⁸'R⁸", -NR⁸C(O)OR⁸ and -NR8C(O)R8; or one of R1 and R2 together with the carbon to which they are attached, R3 and R4 together with the carbon to which they are attached, and R5 and R6 together with the carbon to which they are attached form C(O) or C(=NOH);

m is 0, 1, or 2;

R⁷ is hydrogen, halo or alkyl;

R⁸, R^{8'} and R^{8''} are independently selected from hydrogen, hydroxy, optionally substituted alkoxy, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl; where the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two three. four, or five groups independently selected from alkyl, halo, hydroxy, hydroxyalkyl, optionally substituted alkoxy, alkoxyalkyl, haloalkyl, carboxy, alkoxycarbonyl, alkenyloxycarbonyl, optionally substituted cycloalkyl, optionally substituted cycloalkyloxycarbonyl, optionally substituted aryl, optionally substituted aryloxy, optionally substituted aryloxycarbonyl, optionally substituted arylalkyl, optionally substituted arylalkyloxy, optionally substituted arylalkyloxycarbonyl, nitro, cvano, optionally substituted heterocycloalkyl, optionally substituted heteroaryl, -S(O), R31 (where n is 0, 1, or 2 and R³¹ is optionally substituted alkyl, optionally substituted aryl, optionally substituted heterocycloalkyl, or optionally substituted heteroaryl), -NR34SO2R34a (where R34 is hydrogen or alkyl and R34a is alkyl, alkenyl, cycloalkyl, aryl, heteroaryl, or heterocycloalkyl), -SO₂NR³⁵R^{35a} (where R³⁵ is hydrogen or alkyl and R35a is alkyl, alkenyl, cycloalkyl, aryl, heteroaryl, or heterocycloalkyl), -NR32C(O)R32a (where R32 is hydrogen or alkyl and R32a is alkyl, alkenyl, alkoxy, or cycloalkyl), -NR30R30' (where R30 and R30 are independently hydrogen, alkyl, or hydroxyalkyl), and —C(O)NR33R33a (where R33 is hydrogen or alkyl and R^{33a} is alkyl, alkenyl, alkynyl, or cycloalkyl):

R⁹ is alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl; where the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two, three, four, or five groups selected from halo, hydroxy, alkyl, haloalkyl, haloalkoxy, amino, alkylamino, and dialkylamino;

Group B:

A is heteroarylene optionally substituted with one, two, three, or four groups selected from R¹⁰, R¹², R¹⁴, R¹⁶ and R¹⁹ where R¹⁰, R¹², R¹⁴ and R¹⁶ are independently hydrogen, alkyl, alkenyl, alkynyl, halo, haloalkovy, hydroxy, alkoxy, cyano, amino, alkylamino, dialkylamino, haloalkyl, alkylsulfonylamino, alkylcarbonyl, alkenylcarbonyl, alkylaminocarbonyl, alkylaminocarbonyl, dialkylaminocarbonyl, or alkylcarbonylamino; where R¹⁹ is hydrogen, alkyl, or alkenyl; and where each alkyl and alkenyl, either alone or as part of another group within R¹⁰, R¹², R¹⁴, R¹⁵, and R¹⁹, is independently optionally substituted with halo, hydroxy, or alkoxy;

X is alkyl, halo, haloalkyl, or haloalkoxy;

R¹, R², R³, R⁴, R⁵ and R⁶ are independently hydrogen, halo, nitro, —NR⁸R⁸′, —OR⁸, —NHS(O)₂R⁸′, —CN, —S(O)_mR⁸′, —S(O)₂NR⁸R⁸′, —C(O)R⁸′, —C(O)OR⁸′, —CO)MR⁸R⁸′, —NR⁸C(O)OR⁸′, —NR⁸C(O)OR⁸′, —H₂N(CO)OR⁸′, —H₂N(CO)OR⁸′, —CH₂N(R²⁵σ)(NR^{25a}R^{25b}), —CH₂NR²⁵C(—NH)(NR^{25a}R^{25b}), —CH₂NR²⁵C(—NH)(N(R^{25a}R^{25b}), —CH₂NR²⁵C(—NH)(N(R^{25a}R^{25b})), —CH₂NR²⁵C(—NH)(N(R^{25a}R^{25b})), —CH₂NR²⁵C(—NH)(N(R^{25a}R^{25b})) —CH(N₂O₂), alkyl, alkenyl, alkynyl, cycloalkyl, heteroaryl, and heterocycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two, three, four, five, six or seven groups independently selected from halo, alkyl, alkey



haloalkyl, nitro, optionally substituted cycloalkyl, optionally substituted aryl, optionally substituted aryl, optionally substituted heterocycloalkyl, optionally substituted heteroaryl, $-OR^8$, $-NR^8RQ^8$, $-NR^8CQ^2$, -CN, $-S(O)_mR^9$, $-C(O)QR^8$, $-C(O)OR^8$, $-C(O)NR^8R^8$, $-NR^8C(O)NR^8R^8$, $-NR^8C(O)NR^8$ and $-NR^8C(O)R^8$; or one of R^1 and R^2 together with the carbon to which they are attached, R^3 and R^4 together with the carbon to which they are attached, and R^5 and R^6 together with the carbon to which they are attached, and R^5 and R^6 together with the carbon to which they are attached form C(O) or C(=NOH);

m is 1 or 2;

R⁷ is hydrogen, halo or alkyl; and

R⁸, R⁸ and R⁸ are independently selected from hydrogen. hydroxy, optionally substituted alkoxy, alkyl, haloalkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl, where the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two three, four, or five groups independently selected from alkyl, halo, hydroxy, hydroxyalkyl, optionally substituted alkoxy, alkoxyalkyl, haloalkyl, carboxy, carboxy ester, nitro, cyano, —S(O), R³¹ (where n is 0, 1, or 2 and R³¹ is optionally substituted alkyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heteroaryl). -NR36S(O)2R36a (where R36 is hydrogen, alkyl, or alkenyl and R36a is alkyl, alkenyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heteroaryl), —S(O)₂NR³⁷R^{37a} (where R³⁷ is hydrogen, alkyl, or alkenyl and R^{37a} is alkyl, alkenyl, optionally substituted arvl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heteroaryl), optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted aryloxy, optionally substituted arvlalkyloxy, optionally substituted heteroaryl, —NHC(O)R³² (where R³² is alkyl, alkenyl, alkoxy, or cycloalkyl) and -NR30R30' (where R30 and R30' are independently hydrogen, alkyl, or hydroxyalkyl), and —C(O)NHR³³ (where R³³ is alkyl, alkenyl, alkynyl, or eveloalkyl):

Group C:

A is

where R¹⁰ is hydrogen, alkyl, alkenyl, alkynyl, halo, haloalkoxy, hydroxy, alkoxy, amino, alkylamino, dialkylamino, haloalkyl, —NHS(O)₂R⁸, —CN, —C(O) R⁸, —C(O)OR⁸, —C(O)NR⁸R^{8'} and NR⁸C(O)R^{8'};

R^{10a} is hydrogen, alkyl, or alkenyl;

 Y^1 is =CH- or =N-;

X is alkyl, halo, haloalkyl, or haloalkoxy;

R¹, R², R³, R⁴, R⁵ and R⁶ are independently hydrogen. halo, nitro, —NR⁸R⁸, —OR⁸, —NHS(O)₂R⁸, —CN, $-S(O)_{m}R^{8}$, $-S(O)_{7}NR^{8}R^{8'}$, $-C(O)R^{8}$, $-C(O)OR^{8}$, -C(O)NR⁸R⁸', -NR⁸C(O)OR⁸', -NR⁸C(O)NR⁸'R⁸". $-NR^8C(O)OR^{8'}$, $-NR^8C(O)R^{8'}$, $-CH_2N(R^{25})$ $(NR^{25a}R^{25b}),$ $-CH_1NR^{25}C(=NH)(NR^{25a}R^{25b}),$ $-CH_2NR^{25}C(=NH)(N(R^{25a})(NO_2)), -CH_2NR^{25}C$ $(=NH)(N(R^{25a})(CN)), -CH_2NR^{25}C(=NH)(R^{25}),$ —CH₂NR²⁵C(NR^{25a}R^{25b})—CH(NO₂), alkyl, alkenyl, alkynyl, cycloalkyl, heteroaryl, or heterocycloalkyl, where the alkyl, alkenyl, alkynyl, cycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two, three, four, five, six or seven groups independently selected from halo, alkyl, haloalkyl, nitro, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted heteroaryl, —OR8, —NR8R8, —NR8S(O) $_{2}R^{9}$, —CN, —S(O),...R⁹, —C(O)R⁸, —C(O)OR⁸ -C(O)NR⁸R⁸', -NR⁸C(O)NR⁸'R⁸'', -NR⁸C(O)OR⁸' and -NR8C(O)R8; or one of R1 and R2 together with the carbon to which they are attached, R³ and R⁴ together with the carbon to which they are attached, and R5 and R6 together with the carbon to which they are attached form C(O) or C(=NOH);

m is 1 or 2:

R7 is hydrogen, halo or alkyl; and

R⁸, R⁸ and R₈ are independently selected from hydrogen. hydroxy, optionally substituted alkoxy, alkyl, haloalkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl, where the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two three, four, or five groups independently selected from alkyl, halo, hydroxy, hydroxyalkyl, optionally substituted alkoxy, alkoxyalkyl, haloalkyl, carboxy, carboxy ester, nitro, cyano, $-S(O)_{n}R^{31}$ (where n is 0, 1, or 2 and R^{31} is optionally substituted alkyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heteroaryl), -NR36S(O)2R36a (where R36 is hydrogen, alkyl, or alkenyl and R36a is alkyl, alkenyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heteroaryl), —S(O)₂NR³⁷R^{37a} (where R³⁷ is hydrogen, alkyl, or alkenyl and R37a is alkyl, alkenyl, optionally substituted arvl. optionally substituted cycloalkyl. optionally substituted heterocycloalkyl, or optionally substituted heteroaryl), optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted aryloxy, optionally substituted arylalkyloxy, optionally substituted heteroaryl, —NHC(O)R³² (where R³² is alkyl, alkenyl, alkoxy, or cycloalkyl) and -NR30R30' (where R30 and R30' are independently hydrogen, alkyl, or hydroxyalkyl), and —C(O)NHR³³ (where R³³ is alkyl, alkenyl, alkynyl, or cycloalkyl); or



Group D: A is

R⁴⁰ and R^{40a} are independently hydrogen or alkyl; X is alkyl, halo, haloalkyl, or haloalkoxy:

R1, R2, R3, R4, R5 and R6 are independently hydrogen, halo, nitro, -NR⁸R⁸, -OR⁸, -NHS(O)₂R⁸, -CN, $-S(O)_{m}R^{8}$, $-S(O)_{2}NR^{8}R^{8}$, $-C(O)R^{8}$, $-C(O)OR^{8}$, -C(O)NR⁸R⁸', -NR⁸C(O)OR⁸', -NR⁸C(O)NR⁸'R⁸", $-NR^8C(O)OR^{8'}$, $-NR^8C(O)R^8$, $-CH_2N(R^{25})$ $(NR^{25a}R^{25b})$. $-CH_2NR^{25}C(=NH)(NR^{25a}R^{25b})$ $-CH_2NR^{25}C(=NH)(N(R^{25a})(NO_2)), \quad -CH_2NR^{25}C$ $(=NH)(N(R^{25a})(CN)), -CH_2NR^{25}C(=NH)(R^{25}),$ -CH₂NR²⁵C(NR^{25a}R^{25b})=CH(NO₂), alkyl, alkenyl, alkynyl, cycloalkyl, heteroaryl, or heterocycloalkyl, where the alkyl, alkenyl, alkynyl, cycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two, three, four, five, six or seven groups independently selected from halo, alkyl, haloalkyl, nitro, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted arvl, optionally substituted arvlalkyl, optionally substituted heteroaryl, —OR8, —NR8R8', —NR8S(O) $_{2}R^{9}$, -CN, $-S(O)_{m}R^{9}$, $-C(O)R^{8}$, $-C(O)OR^{8}$, -C(O)NR⁸R⁸, -NR⁸C(O)NR⁸R⁸, -NR⁸C(O)OR⁸ and -NR8C(O)R8; or one of R1 and R2 together with the carbon to which they are attached, R3 and R4 together with the carbon to which they are attached, and R5 and R6 together with the carbon to which they are attached form C(O) or C(=NOH);

m is 1 or 2;

R7 is hydrogen, halo or alkyl; and

R⁸, R⁸ and R₈, are independently selected from hydrogen, hydroxy, optionally substituted alkoxy, alkyl, haloalkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycloalkyl, heteroaryl, and heterocycloalkyl, heteroaryl, and heterocycloalkyl are independently optionally substituted with one, two three, four, or five groups independently selected from alkyl, halo, hydroxy, hydroxyalkyl, optionally substituted alkoxy, alkoxyalkyl, haloalkyl, carboxy, carboxy ester, nitro, cyano, —S(O). R³¹ (where n is 0, 1, or 2 and R³¹ is optionally substituted alkyl, optionally substituted

arvl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heteroaryl), -NR³⁶S(O)₂R^{36a} (where R³⁶ is hydrogen, alkyl, or alkenyl and R^{36a} is alkyl, alkenyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heteroaryl), —S(O)₂NR³⁷R^{37a} (where R³⁷ is hydrogen, alkyl, or alkenyl and R^{37a} is alkyl, alkenyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or optionally substituted heteroaryl), optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl, optionally substituted arvlalkyl, optionally substituted arvloxy. optionally substituted arylalkyloxy, optionally substituted heteroaryl, -NHC(O)R32 (where R32 is alkyl, alkenyl, alkoxy, or cycloalkyl) and —NR30R30' (where R30 and R30' are independently hydrogen, alkyl, or hydroxyalkyl), and —C(O)NHR33 (where R33 is alkyl, alkenyl, alkynyl, or cycloalkyl).





Please ask questions

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