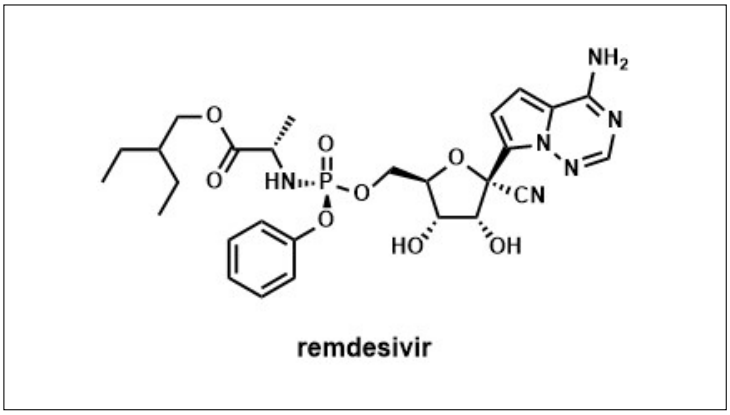
# Remdesivir




remdesivir

**Related reviews in Science of Synthesis**

- 1,2,4-Triazines
- 1,2-Diols
- Nitriles

**Synonyms:** GS-5734; prodrug of GS-441524
**ATC:** -
**Use antiviral:** RNA polymerase inhibitor against Ebola and Corona virus
**Chem. Name:** (S)-2-Ethylbutyl 2-(((S)-(((2R,3S,4R,5R)-5-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl]-5-cyano-3,4-dihydroxytetrahydrofuran-2-yl)methoxy)phenoxy)phosphoryl)amino) propanoate
**Formula:** $C_{27}H_{35}N_6O_8P$
**MW:** 602.59 g/mol
**CAS-RN:** 1809249-37-3

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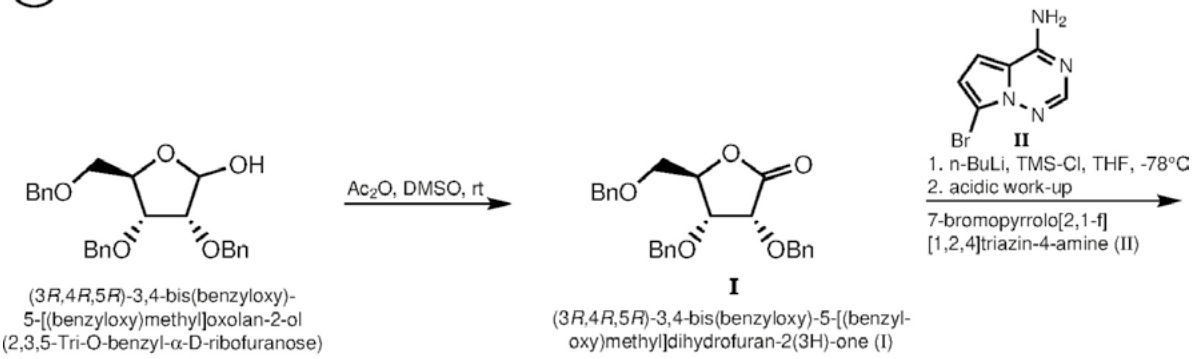
## Synthesis Path

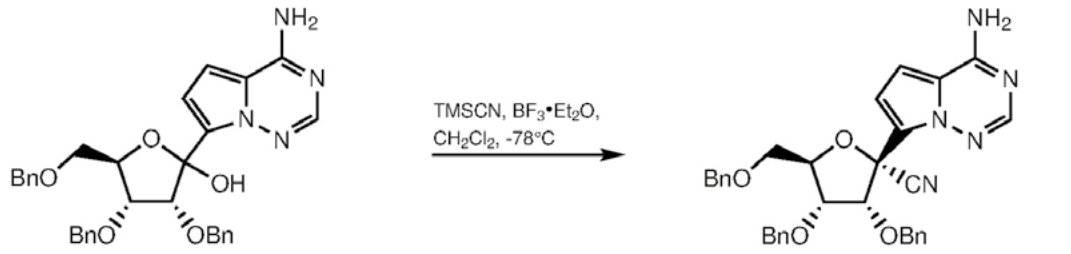
a First generation synthesis:




(3*R*,4*R*,5*R*)-3,4-bis(benzyloxy)-5-[(benzyloxy)methyl]oxolan-2-ol (2,3,5-Tri-O-benzyl-α-D-ribofuranose)

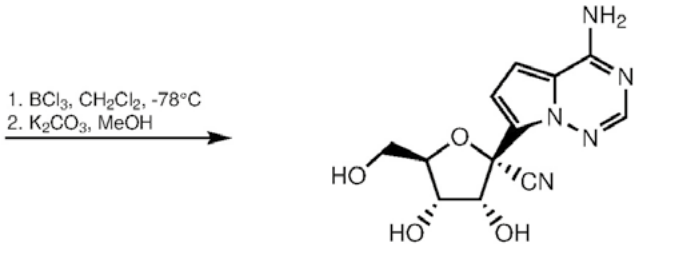
**I**

(3*R*,4*R*,5*R*)-3,4-bis(benzyloxy)-5-[(benzyloxy)methyl]dihydrofuran-2(3H)-one (I)

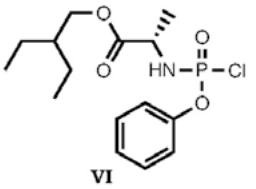



(3*R*,4*R*,5*R*)-2-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-3,4-bis(benzyloxy)-5-[(benzyloxy)methyl]tetrahydrofuran-2-ol (III)

(2*R*,3*R*,4*R*,5*R*)-2-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-3,4-bis(benzyloxy)-5-[(benzyloxy)methyl]tetrahydrofuran-2-carbonitrile (IV)

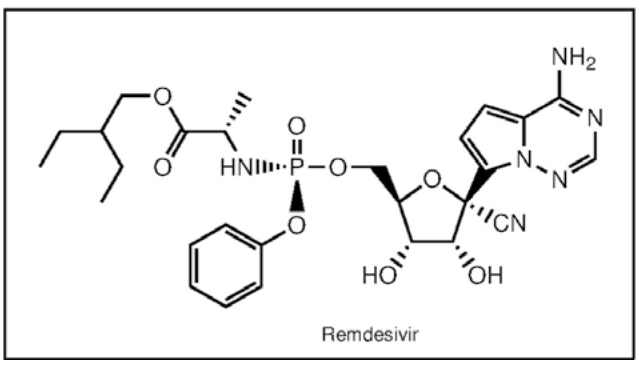



(2*R*,3*R*,4*S*,5*R*)-2-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-3,4-dihydroxy-5-(hydroxymethyl)tetrahydrofuran-2-carbonitrile (V)




1. NMI, $OP(OMe)_3$
2. chiral HPLC

methyl imidazole, trimethyl phosphate, (2*S*)-2-ethylbutyl 2-(chloro-(phenoxy)phosphorylamino)-propanoate (VI)

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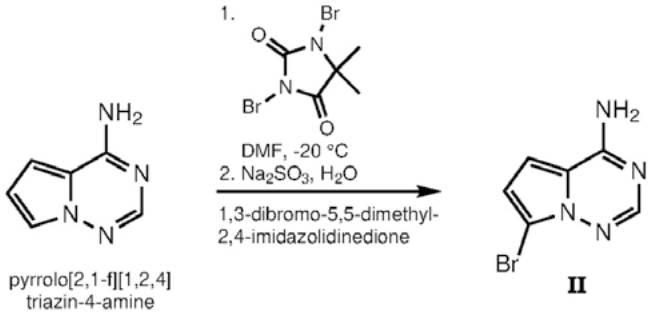
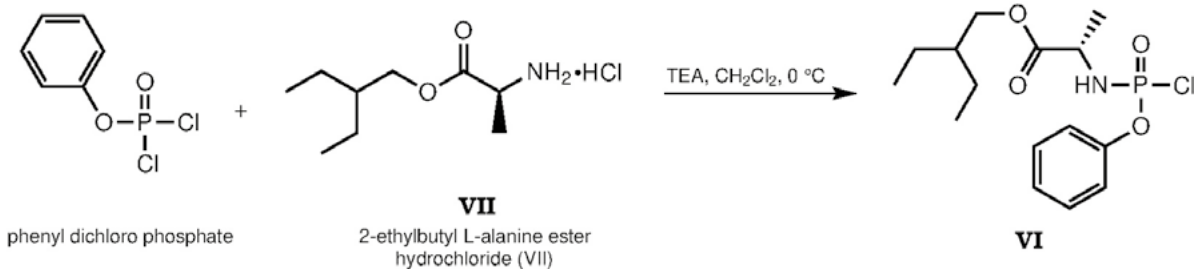
ab Synthesis of II:




ac Synthesis of VI:

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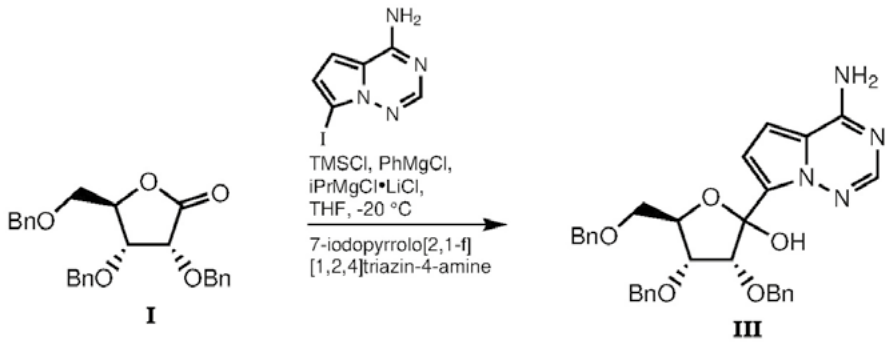
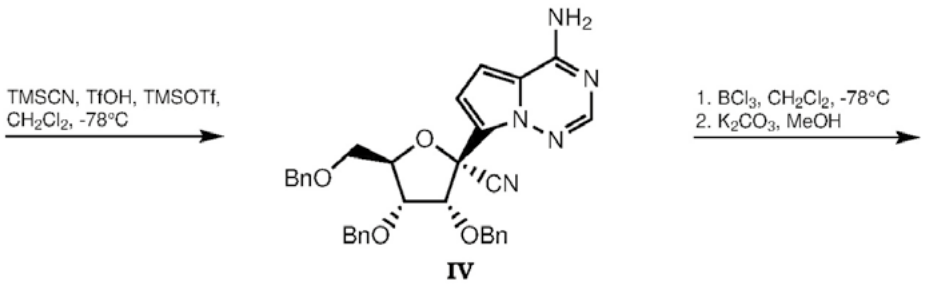
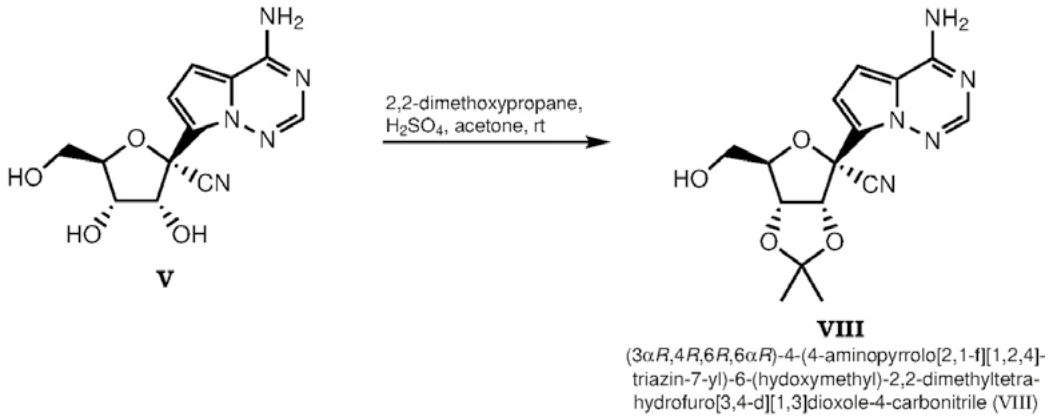
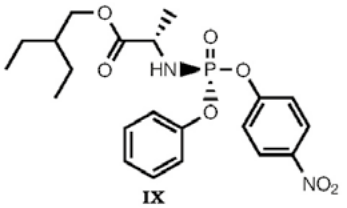
b Second generation synthesis:



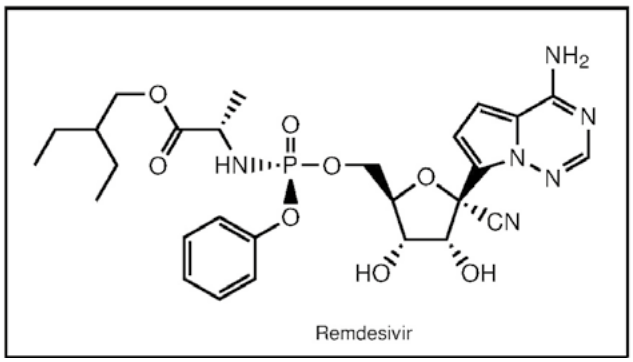




1. $MgCl_2$, DIPEA, MeCN, 50 °C
2. 37% HCl, THF, rt

2-ethylbutyl ((*S*)-(4-nitro-phenoxy)
(phenoxy)phosphoryl)-
L-alaninate (IX)

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## Trade Names

| Country | Trade Name | Vendor | Annotation |
|---|---|---|---|
| USA | | | On 1 May 2020 FDA granted Gilead Sciences an Emergency Use Authorization of remdesivir to be distributed and used by licensed health care providers to treat hospitalized patients with severe COVID-19. |

## Formulations

vial, powder for concentrate for solution for infusion 100 mg

## References

Warren, T.K. et al., Nature, (2016) 531 (7594), 381-385.
Grein, J. et al., NEJM April 10, 2020; doi 10.1056/NEJMoa 2007016.
Avataneo, V. et al., J. Antimicrob. Chemother, May 3, 2020; doi 10.1093/jac/dkaa 152.
a+b) Siegel, D. et al., J. Med. Chem., (2017) 60, 1648-1661.
US 9 724 360 (Gilead Sciences; 8.8.2017; appl. 29.10.2015; USA-prior. 29.10.2014).

***Methods for treating arenaviridae and coronaviridae virus infections:***
US 2017 0071964 (Gilead Sciences; 16.3.2017; appl. 16.9.2016; USA-prior. 16.9.2015).

***Crystalline forms:***
US 2018 346504 (Gilead Sciences; 6.12.2018; appl. 27.4.2018; USA-prior. 1.5.2017).

***Compositions comprising an RNA polymerase inhibitor:***
US 2019 083525 (Gilead Sciences; 21.3.2019; appl. 10.7.2018; USA-prior. 11.7.2017).

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